

East San Joaquin Water Quality Coalition
Irrigated Lands Regulatory Program
Groundwater Assessment Report (GAR)

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March 3, 2014

Coalition Overview

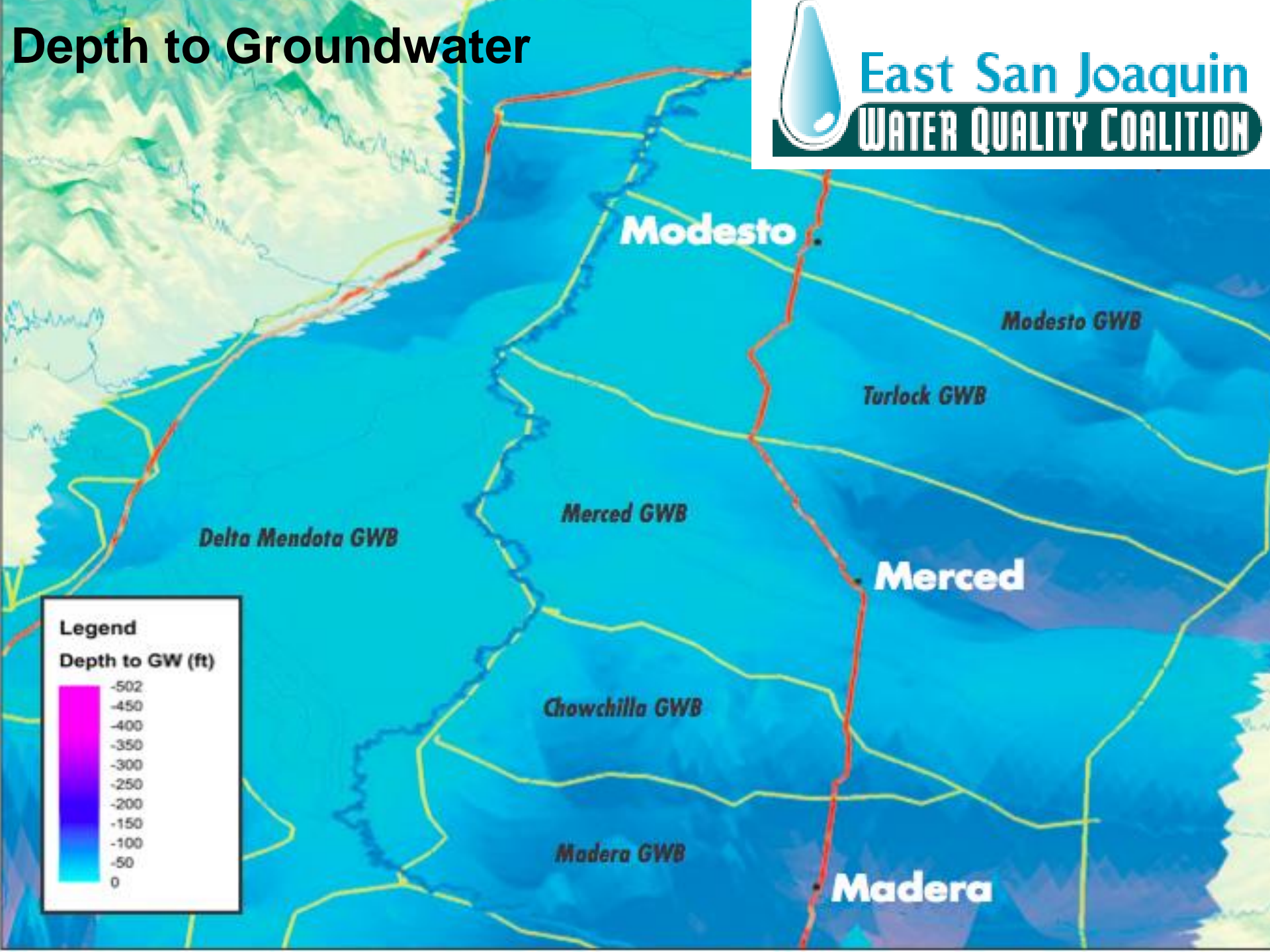
- **3,993 Landowner / operators**
- **716,051 irrigated acres**
 - Madera, Merced, Stanislaus, Tuolumne, Mariposa counties
- Managed by Board of Directors
- In operation since 2003
- Member dues: \$3.75/ac + \$50
 - *Pay \$.75/ac for State Board fee*
- \$3.1 million 2014 budget
 - Surface and groundwater programs
 - Outreach
 - State fees



Depth to Groundwater

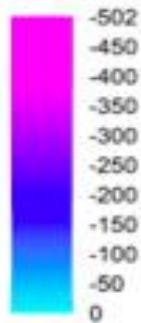


East San Joaquin
WATER QUALITY COALITION



Legend

Depth to GW (ft)





Objectives

Groundwater Assessment Report (GAR)

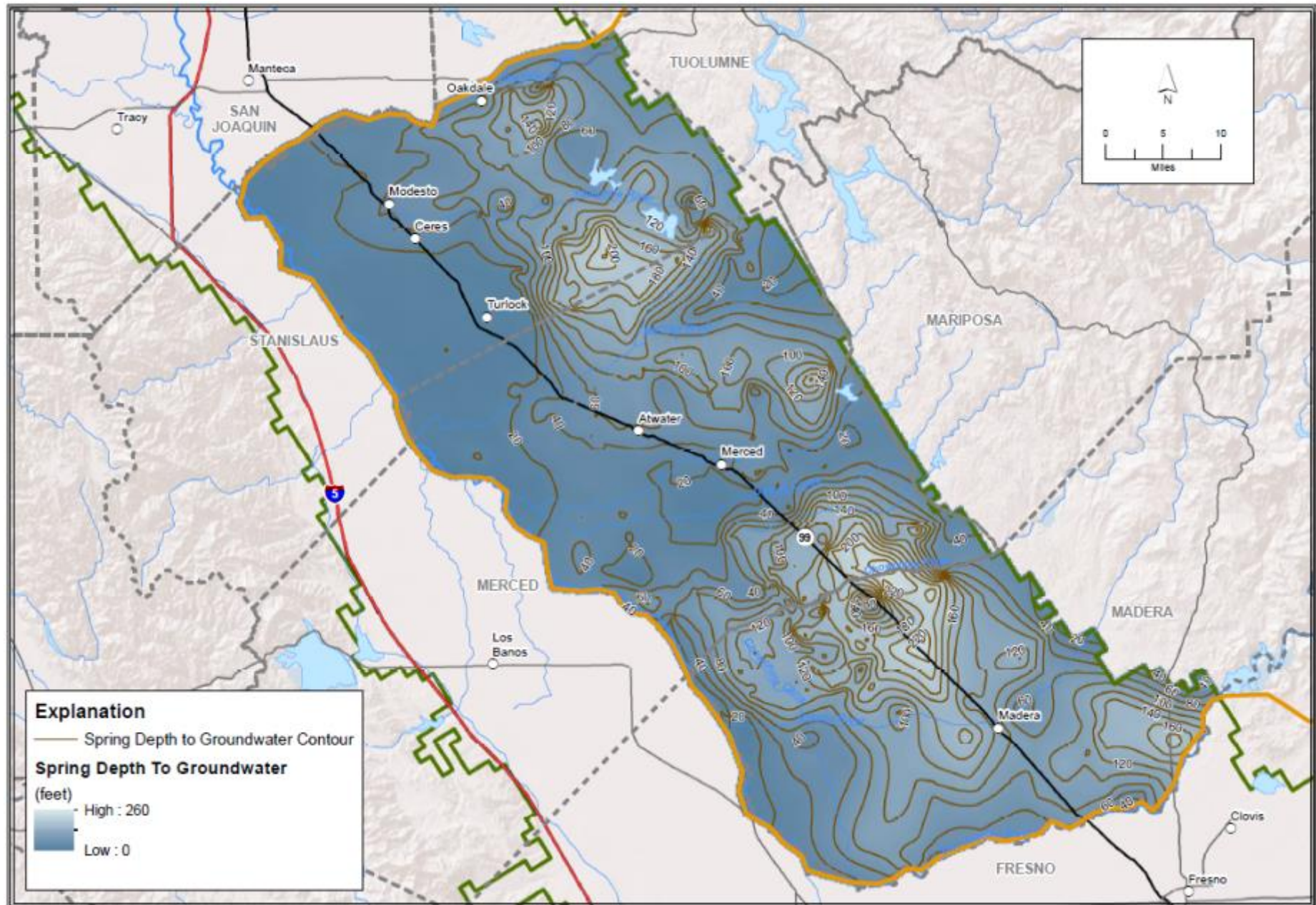
- Establish current GW quality in the Eastern San Joaquin River Watershed area
- Evaluate irrigated ag influence on GW quality
- Provide scientifically-based method to evaluate the vulnerability of areas
- Identify and prioritize high-vulnerability areas for future groundwater management plans

Work by Luhdorff & Scalmanini, Consulting Engineers

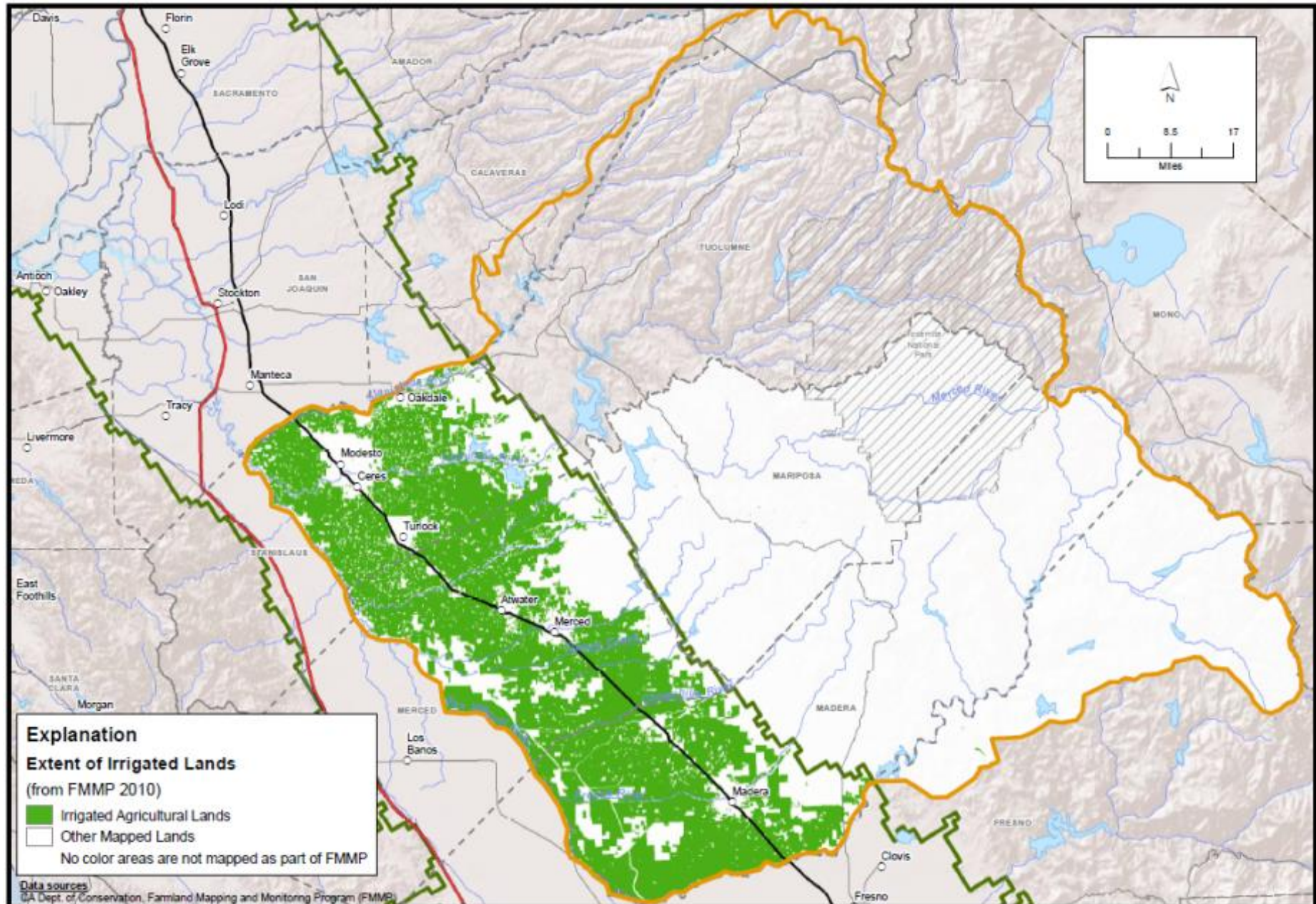
GAR Report to Regional Water Board...

- Hydrogeology for ESJ region
 - Groundwater levels
- Land Use
- Groundwater Quality
- Groundwater Vulnerability Assessment
 - Determine high vulnerability areas
 - Identify wells with nitrate exceedances ($> 10 \text{ mg/L NO}_3\text{-N}$)
- Prioritize High Vulnerability Areas for Actions
- Basis for Future GW Trend Monitoring Program
 - Candidate sites identified

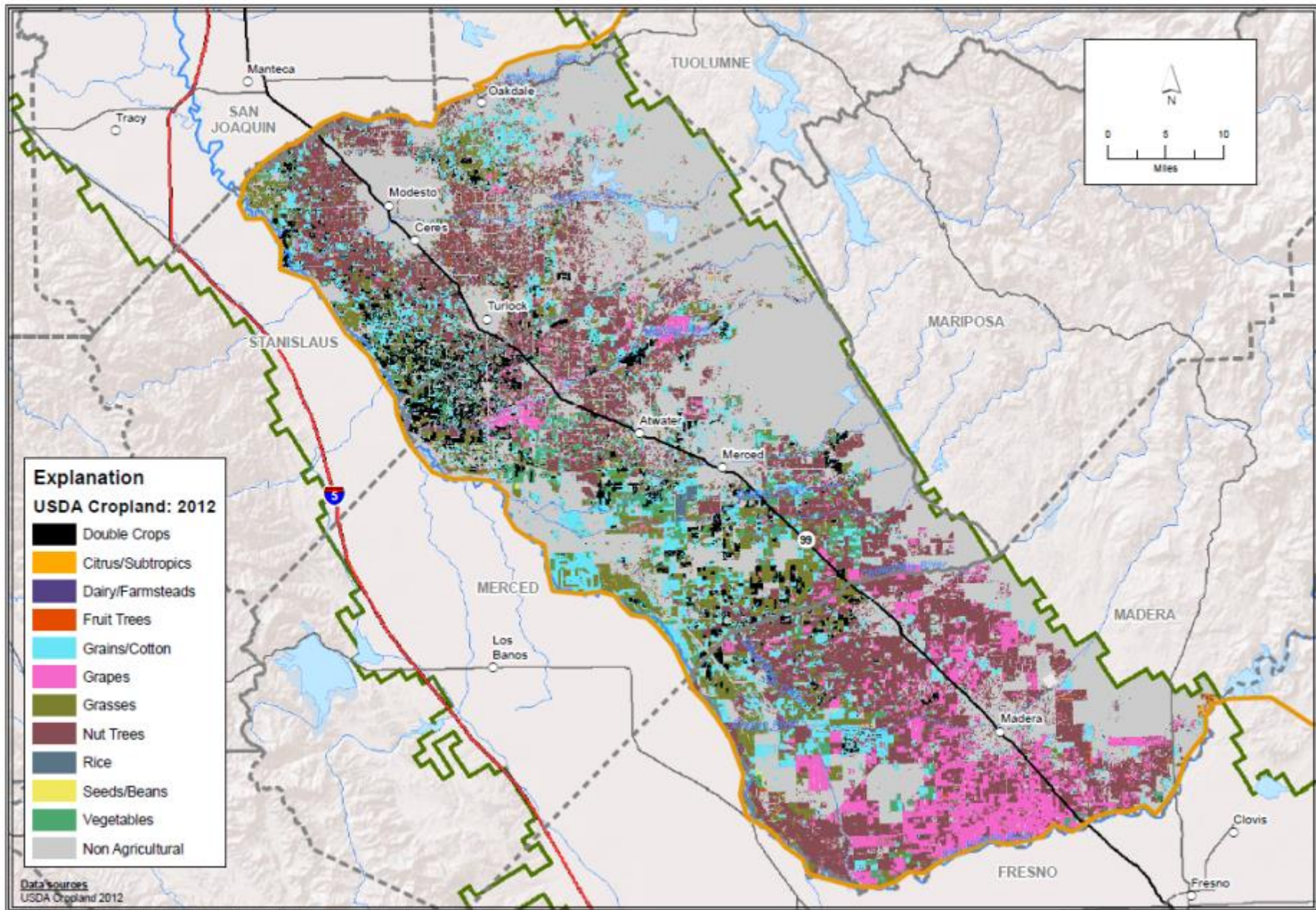
Spring Depth to Groundwater



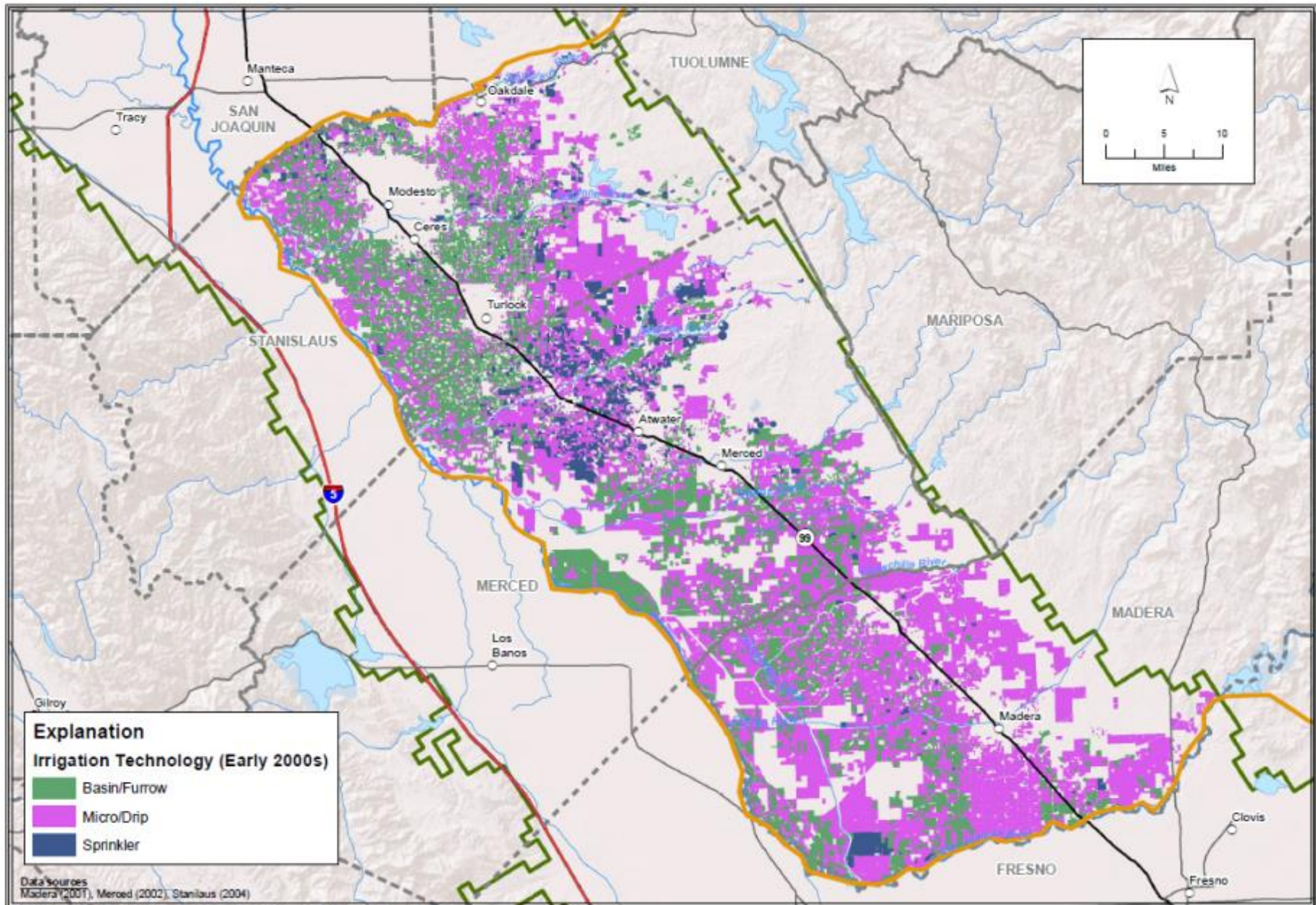
Extent of Irrigated Lands



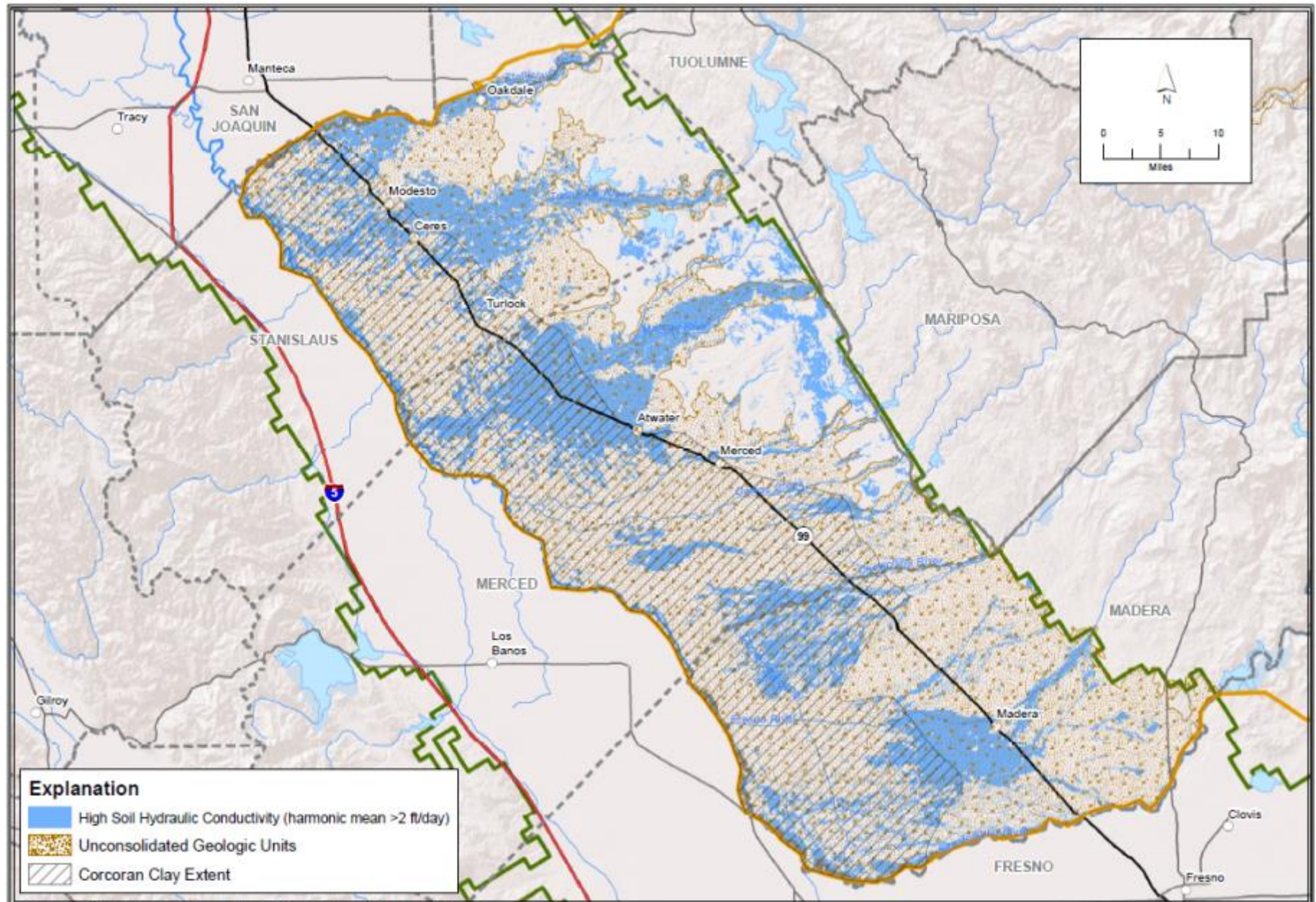
Land Use 2012 (USDA)



Irrigation Practices (DWR Early 2000s)



Potential Groundwater Recharge Areas

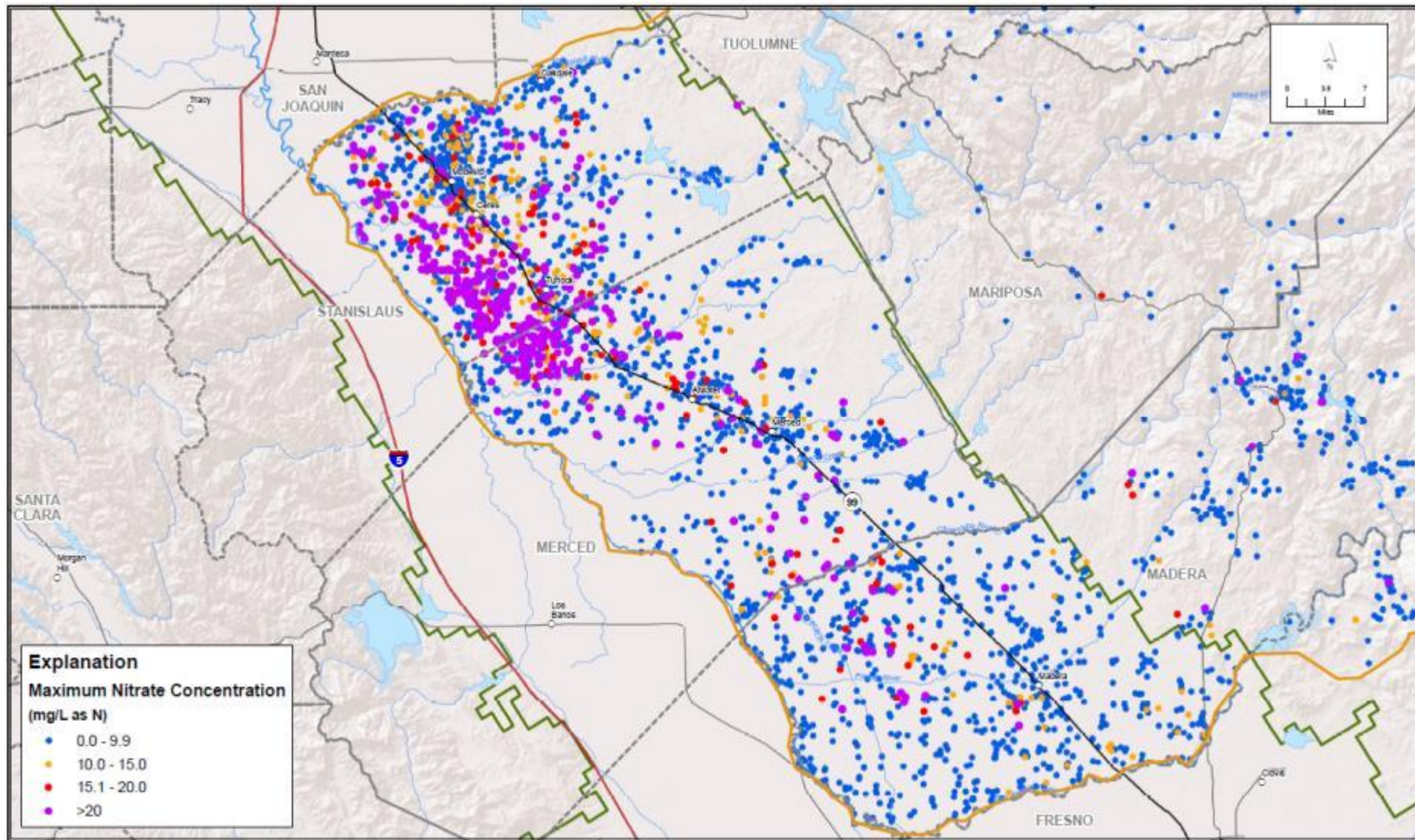




Groundwater Data Review

- Publically accessible data
 - GW quality and levels
- Data from local entities
- Focus on nitrate, TDS, pesticides
 - 6,572 wells with nitrate detections
- Reconnaissance summaries, other constituents

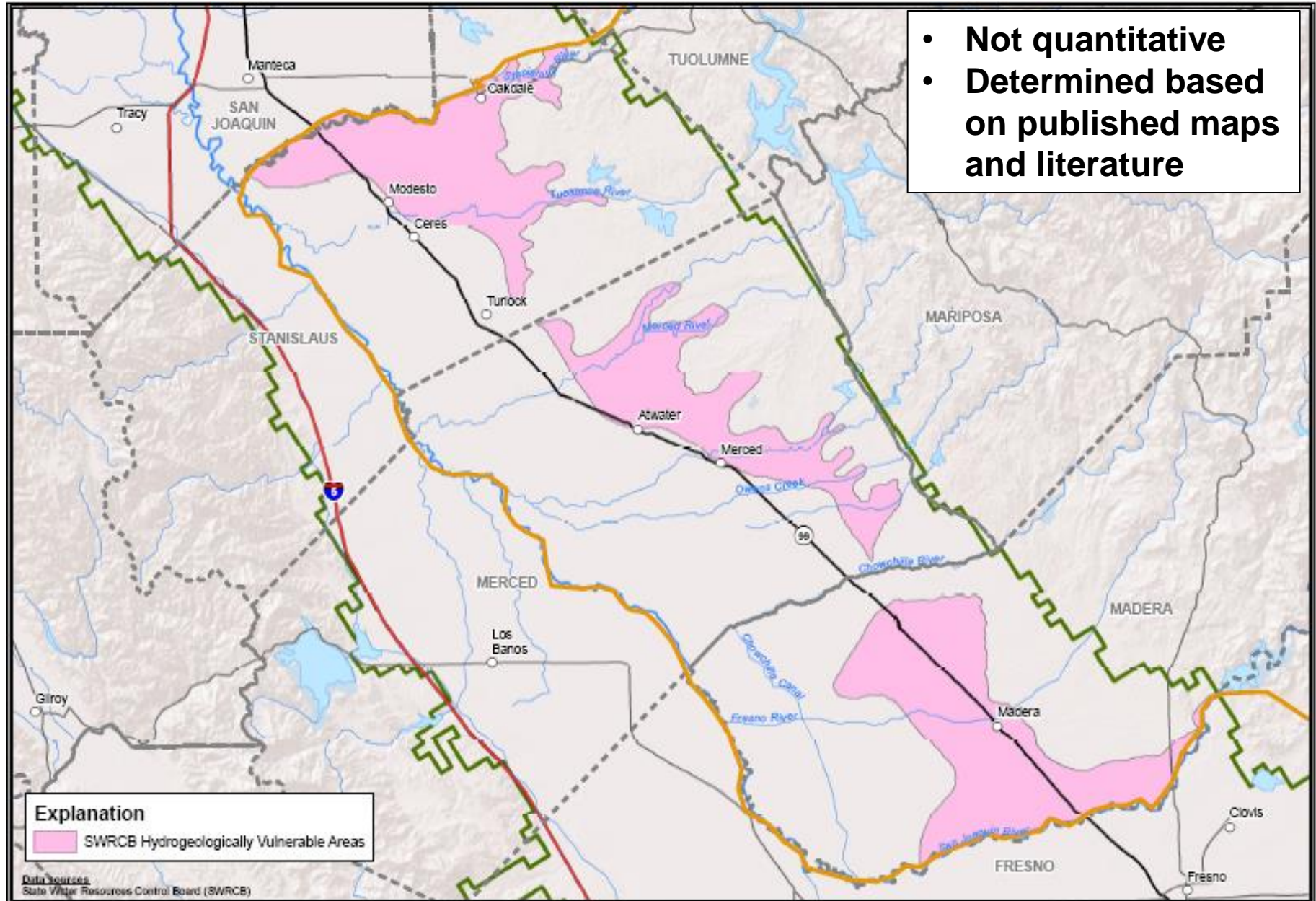
GW Quality: Nitrate Concentrations



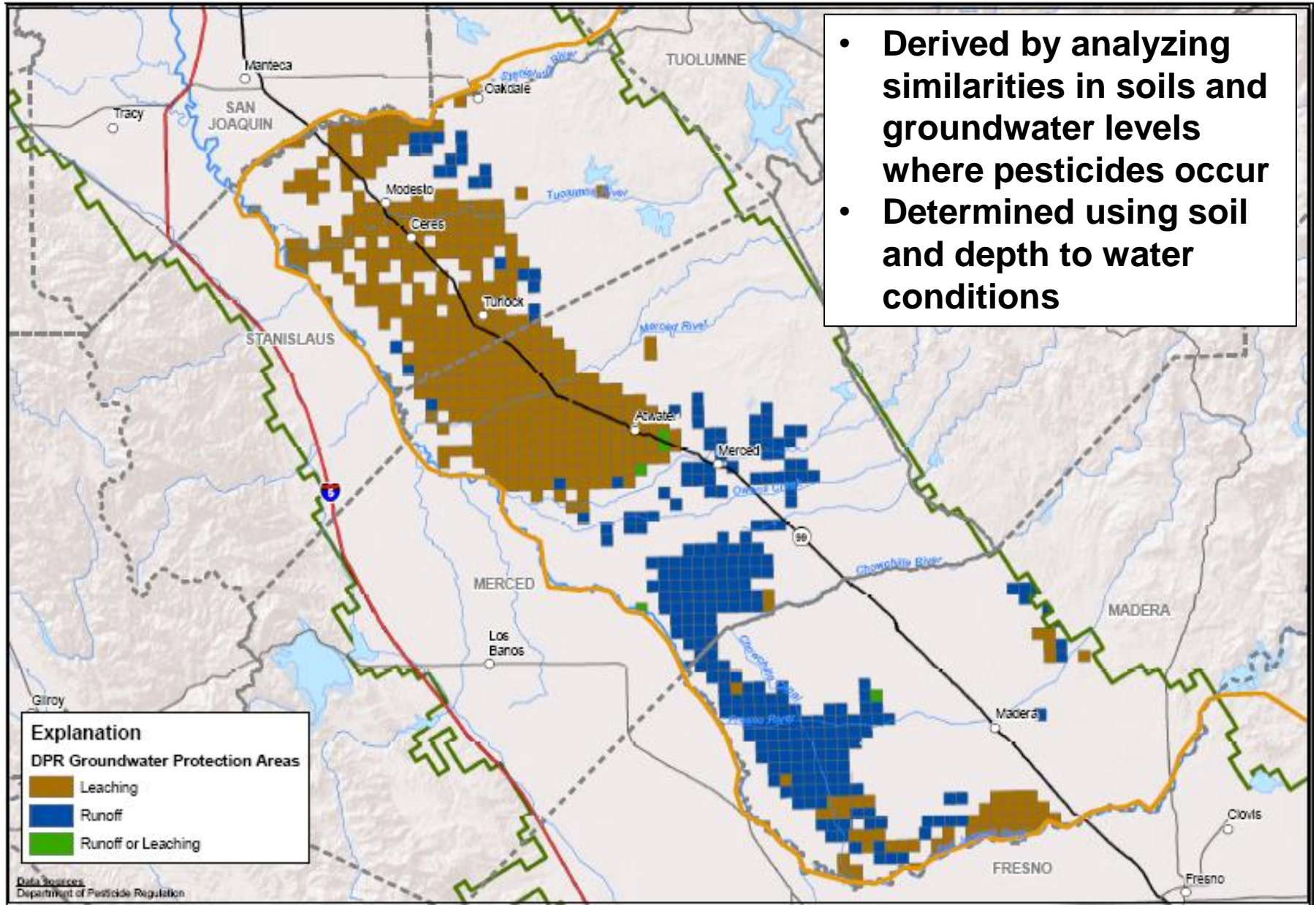
Groundwater Vulnerability Determination

- ESJWQC GAR Vulnerability Assessment
 - Considers hydrogeologic characteristics
 - Observed groundwater quality
 - Land use
 - Scientific/quantitative approach
- Compared to Other Vulnerability Approaches / Delineations
 - SWRCB
 - Calif. Department of Pesticide Regulation

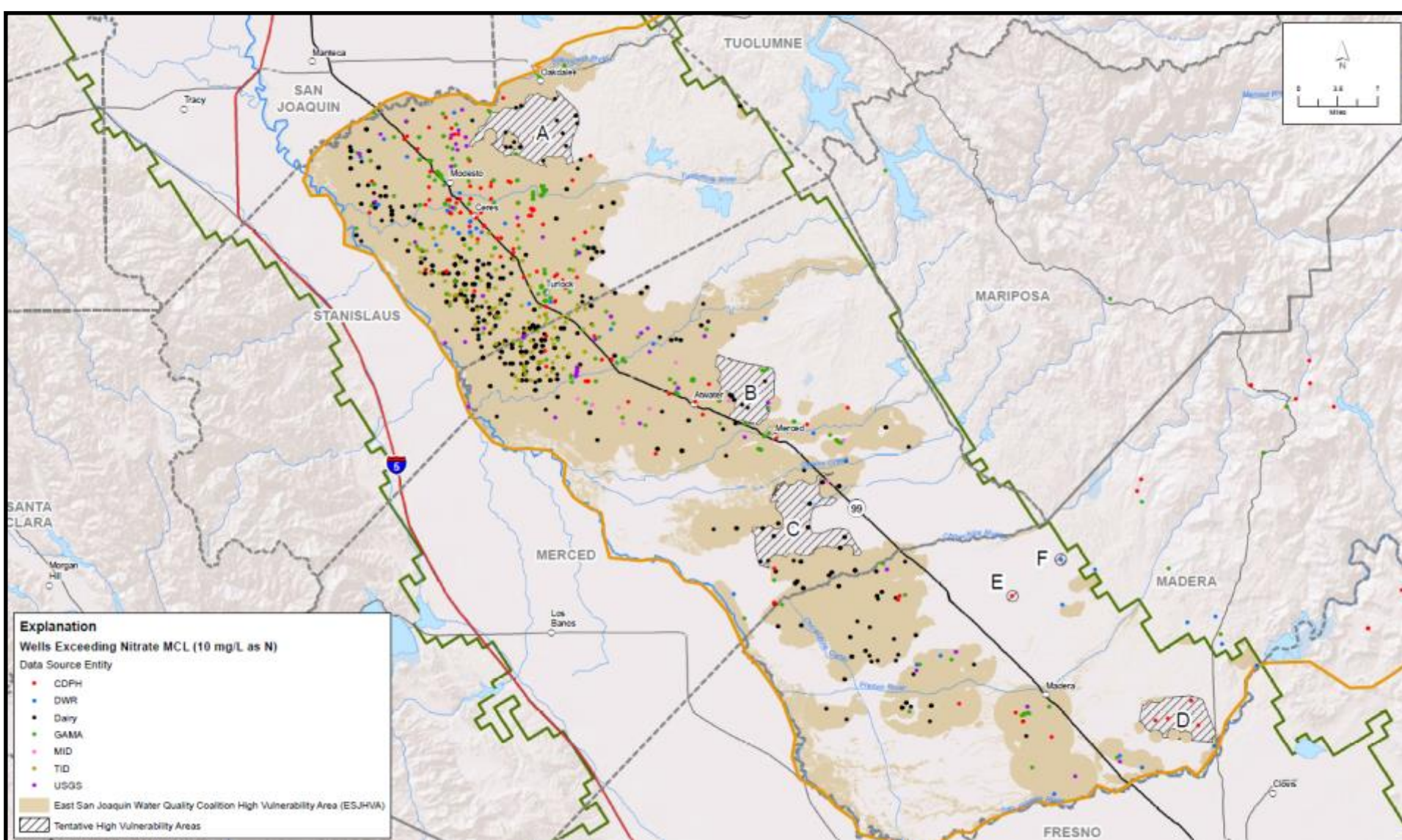
SWRCB Hydrogeologic Vulnerability Area



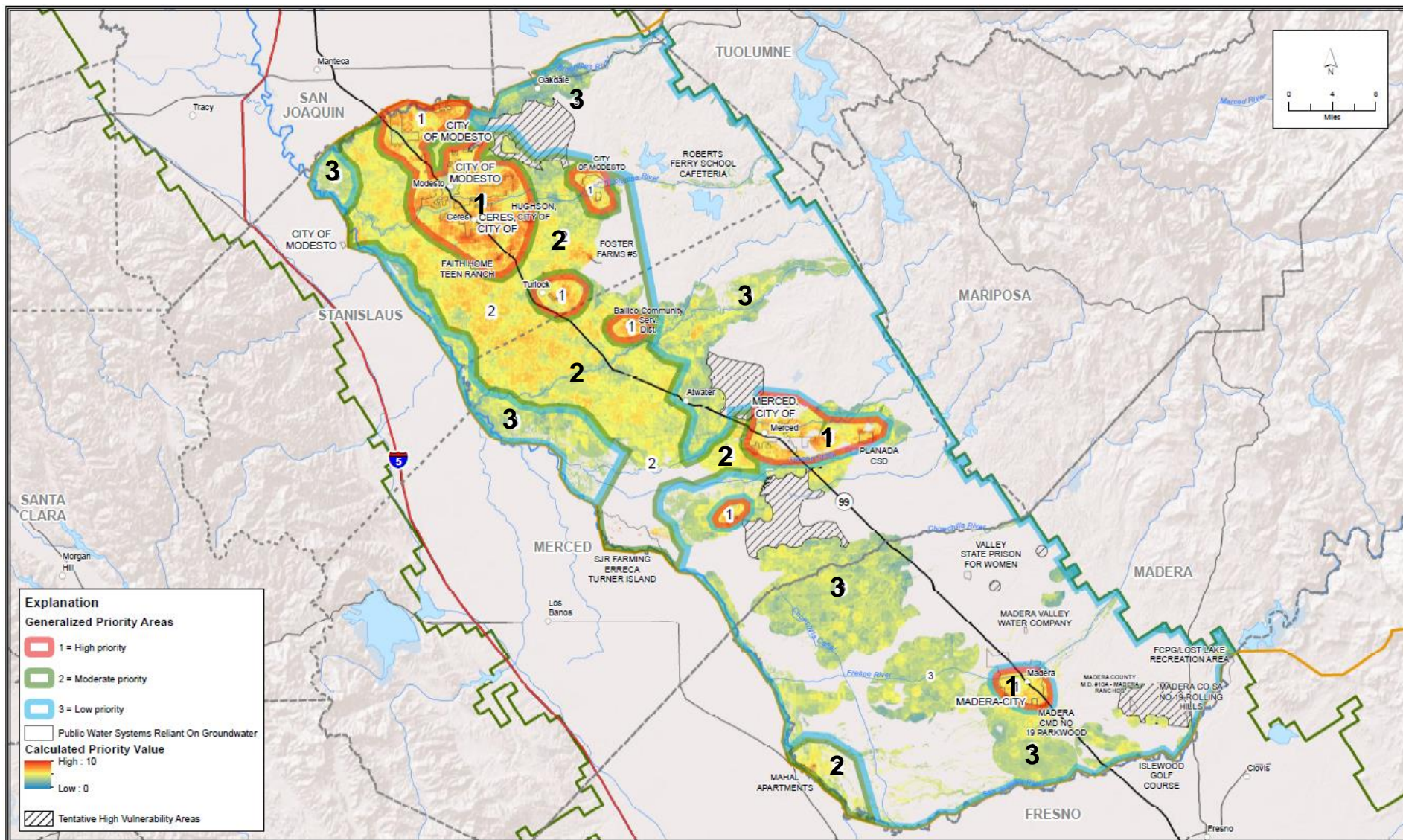
DPR GW Protection Areas



Proposed High Vulnerability Area: ESJWQC Region – Compared to $\text{NO}_3 > 10 \text{ mg/L}$



High Vulnerability Priority Areas



GAR GW Vulnerability Analysis

Luhdorff & Scalmanini, Consulting Engineers

Vicki Kretsinger

Objective:

Isolate influence of hydrogeologic factors on GW quality to characterize GW vulnerability

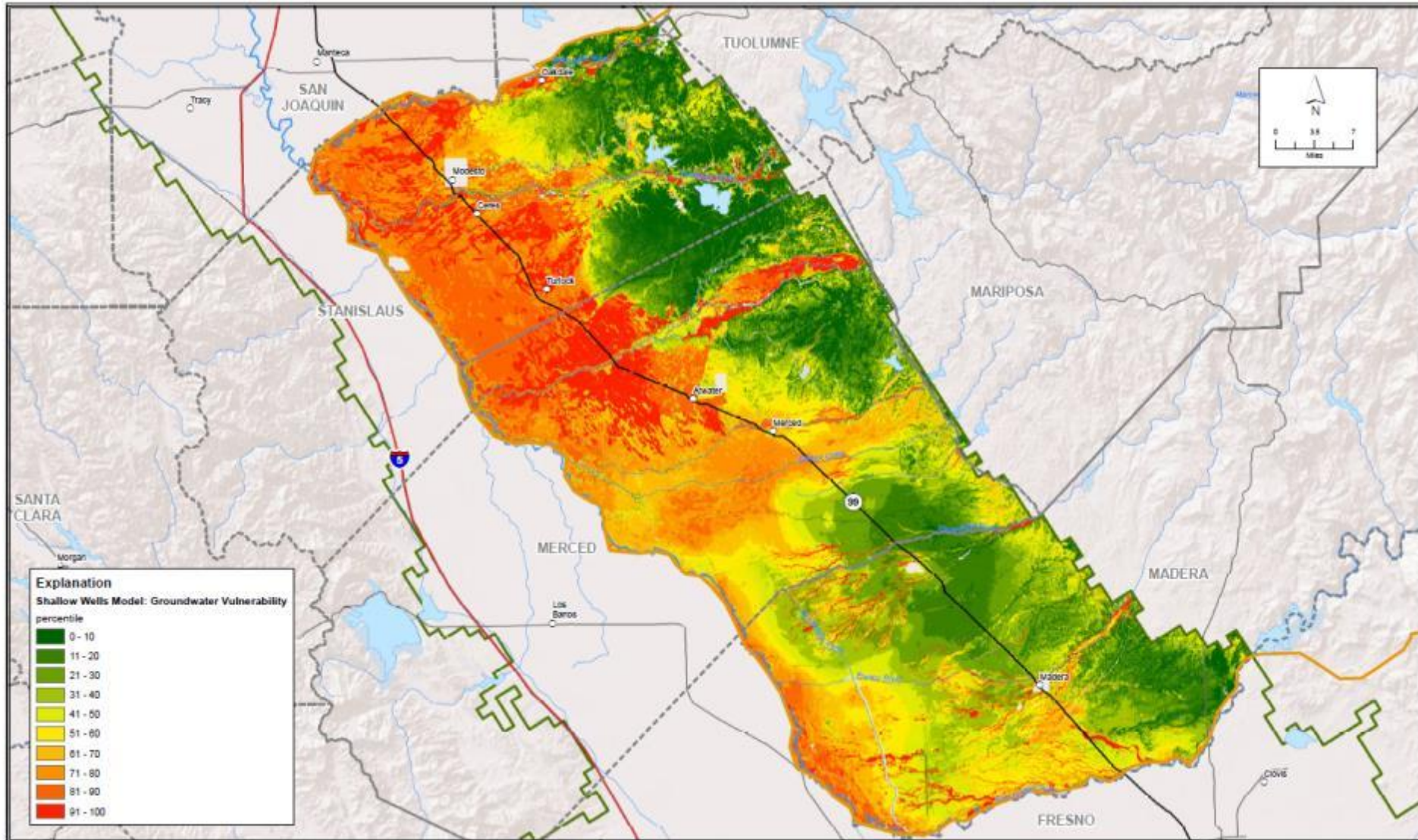
Method:

Statistical analyses to identify relationship of *explanatory variables* (hydrogeologic parameters) in determining *response variable* (GW quality)

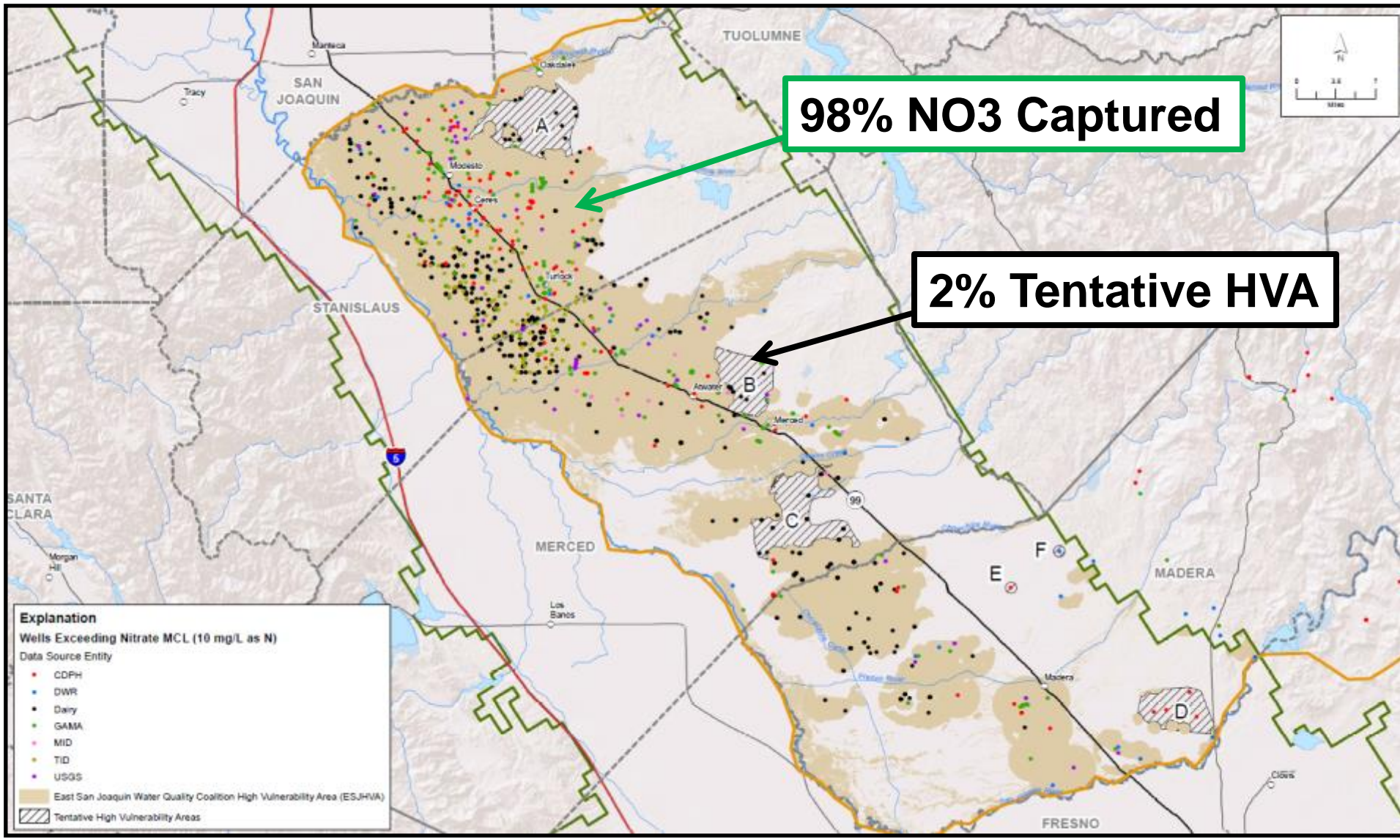
Evaluated Several Models

- Developed several GW vulnerability models based on results from multiple regression analyses
 - Considered land use (mid-90s, early 2000s, 2012)
- Model performance evaluated
 - Consistency with hydrogeologic setting and mechanisms
 - Nitrate-N concentrations (>10 mg/L and >5 mg/L)
- Final model comparison
 - DPR/SWRCB vulnerability areas
 - Nitrate
 - Pesticides

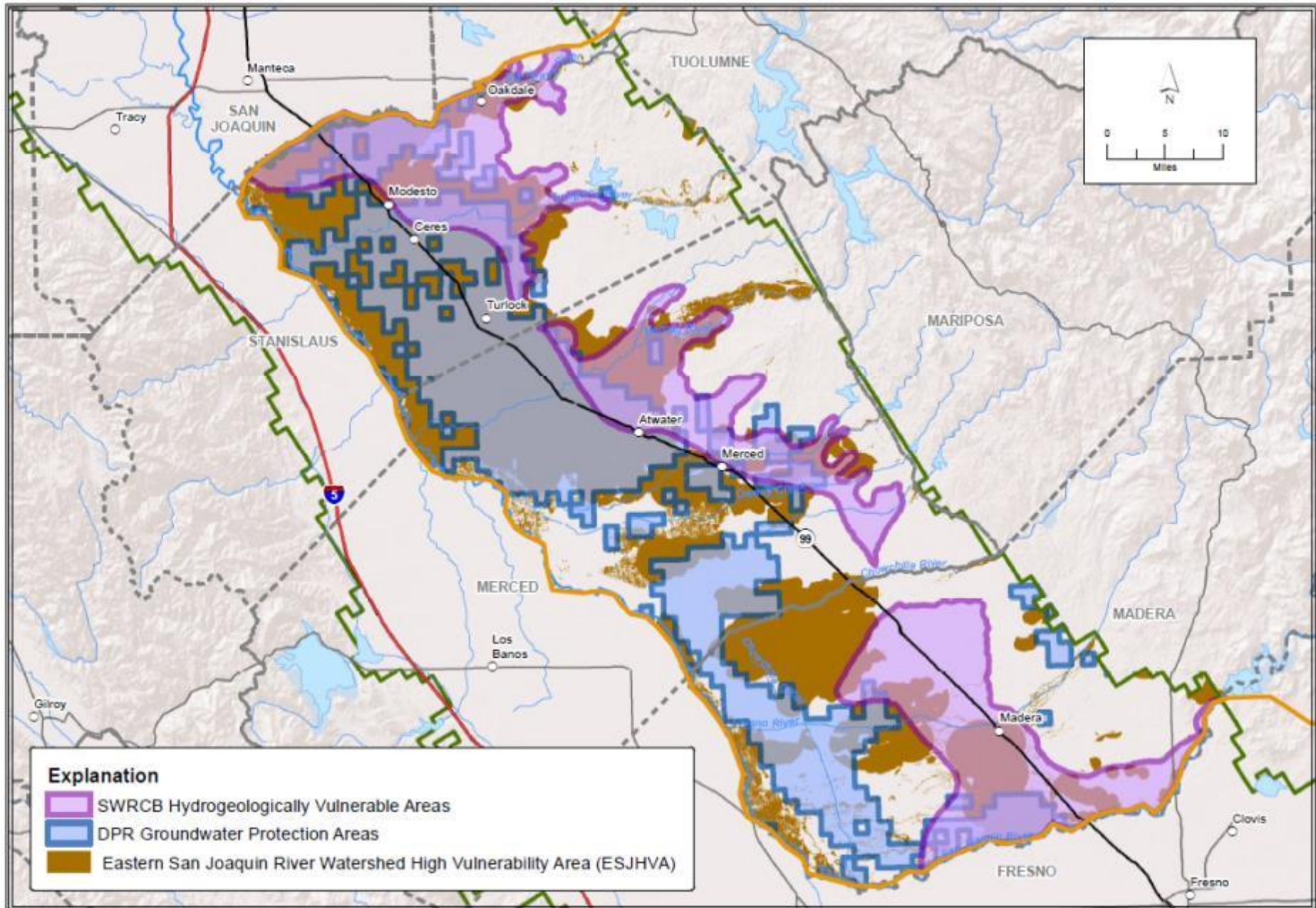
Shallow Wells Model Groundwater Vulnerability



Proposed High Vulnerability Area: ESJHVA – Compared to $\text{NO}_3 > 10 \text{ mg/L}$



ESJHVA Compared to DPR & SWRCB



Comparison of Vulnerability Designations: Nitrate Exceedance Wells

Vulnerability Designation	High No. Wells *	Low No. Wells*	High %*	Low %*
ESJHVA	1,412	32	98	2
SWRCB HVA	305	1,139	21	79
DPR Area	1,030	414	71	29
Combined SWRCB & DPR	1,182	262	82	18

* Wells with a Nitrate Exceedance by Vulnerability
Total Number of Wells 1,444

Comparison of Vulnerability Designations: Pesticide Exceedance Wells

Vulnerability Designation	High No. Wells *	Low No. Wells*	High %*	Low %*
ESJHVA	367	0	100	0
SWRCB HVA	253	114	69	31
DPR Area	244	123	66	34
Combined SWRCB & DPR	339	28	92	8

* Wells with a Pesticide Exceedance by Vulnerability
Total Number of Wells 1,444

Prioritization Criteria/Numeric Ranking

- Hydrogeologic GW vulnerability
- Existing GW quality conditions
 - Identified exceedances
 - Pesticide detections
- Land use
 - Typical N application rates and irrigation methods
- Other factors
 - Proximity to public water supply (distance and location relative to GW gradient)



Calculated Priority Values

Explanation

Generalized Priority Areas

- 1 = High priority
- 2 = Moderate priority
- 3 = Low priority

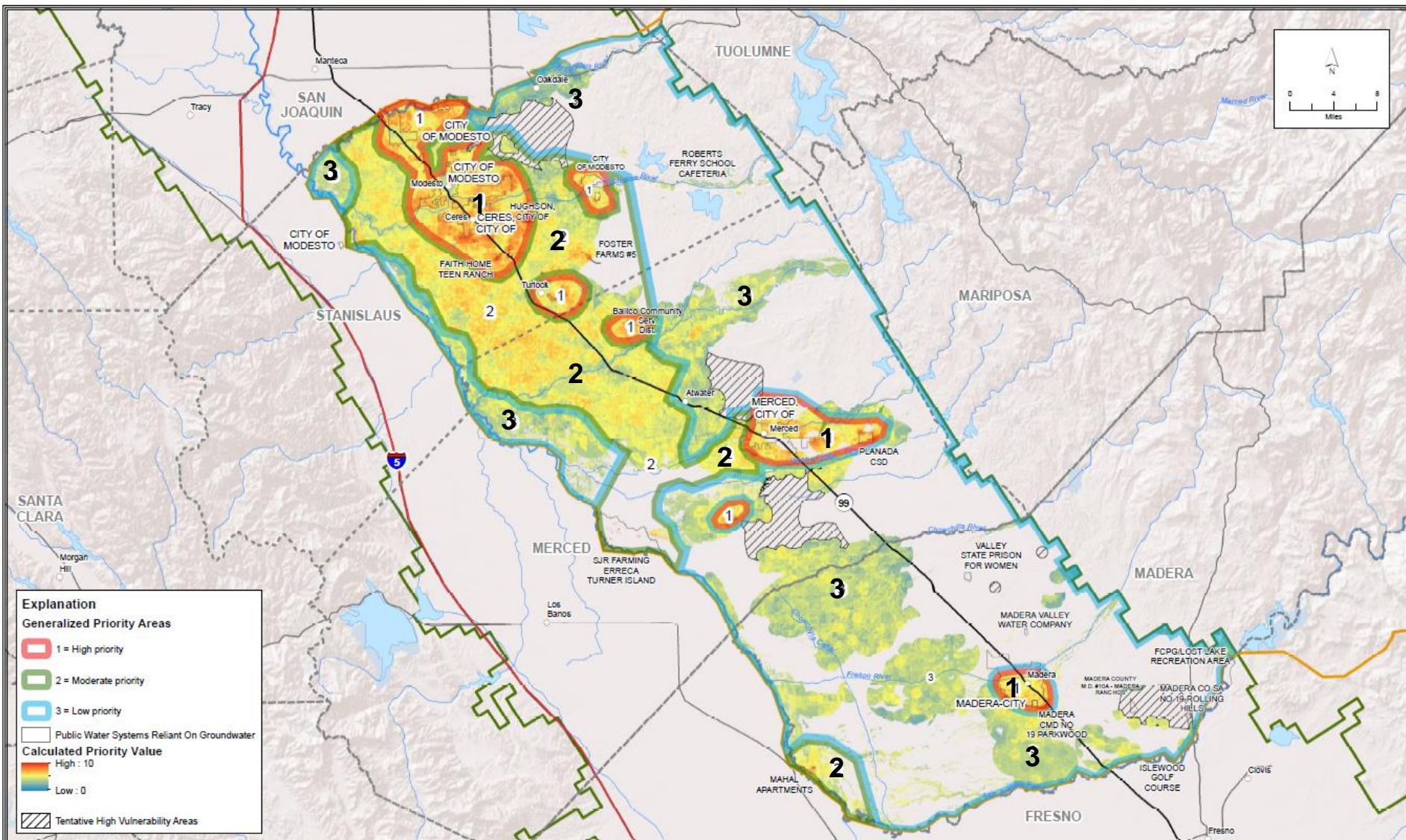
Public Water Systems Reliant On Groundwater

Calculated Priority Value

High : 10

Low : 0

Tentative High Vulnerability Areas



Summary Key Results

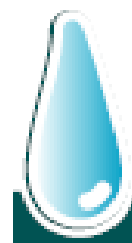
ESJHVA Compared to...

- **Nitrate (6,572 wells; 1,444 wells w/exceedances):**
 - ESJHVA captures 98% of exceedances
 - SWRCB HVA captures 21%
 - DPR Area captures 71%
- **Pesticides (2,732 wells; 367 wells w/detections above MCL or WQ objective):**
 - ESJHVA captures 100% of exceedances
 - SWRCB HVA captures 69%
 - DPR Area captures 66%

Summary Key Results

- Science-based foundational document
- Supports GAR and other requirements in WDR
- Six Tentative High Vulnerability Areas
 - Distinct from areas denoted as ESJHVA
 - Included in total HVA until further investigation
- Need better access to well-related info

*Remember: This is what ESJWQC Proposed!
Regional Water Board yet to comment/approve*



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Questions?

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